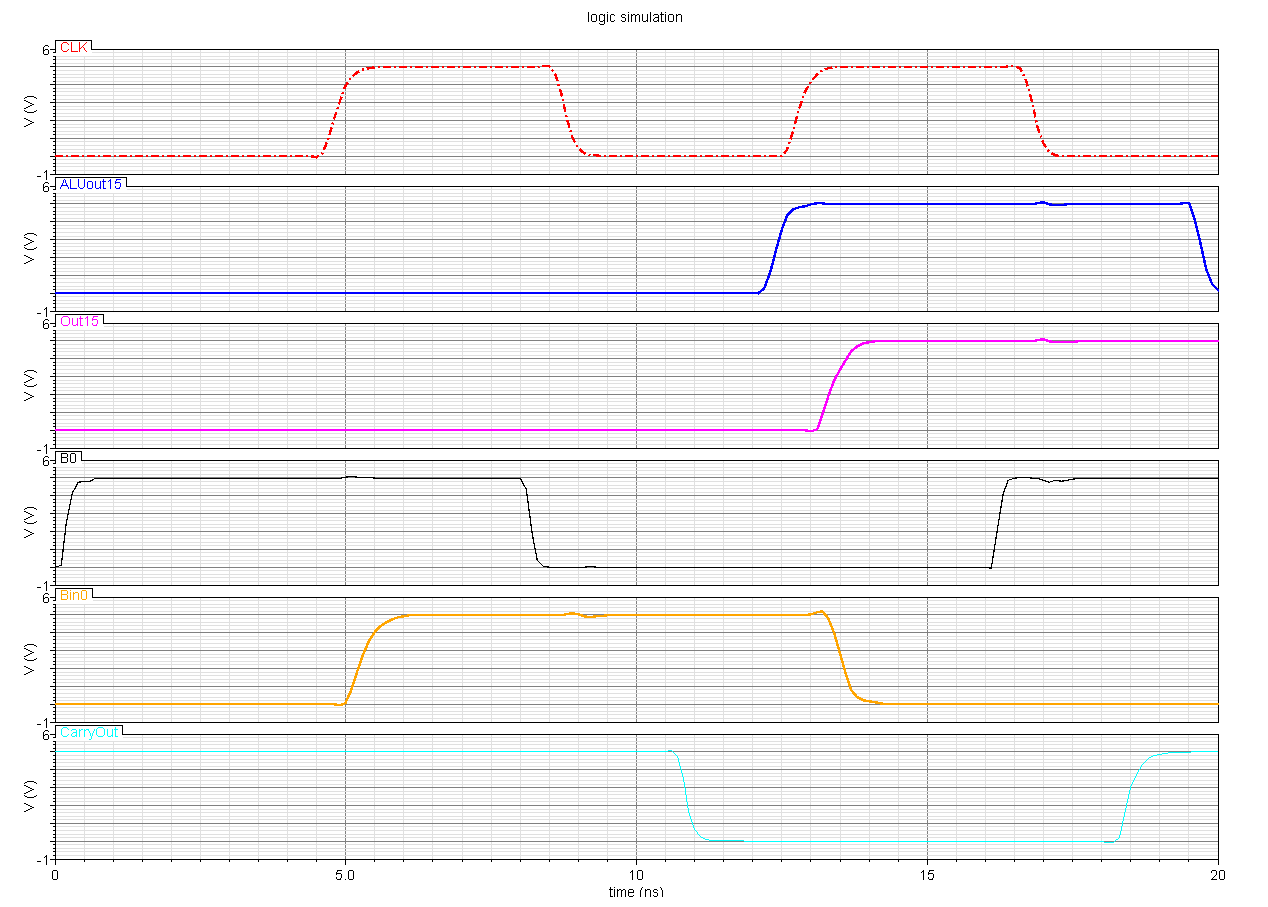
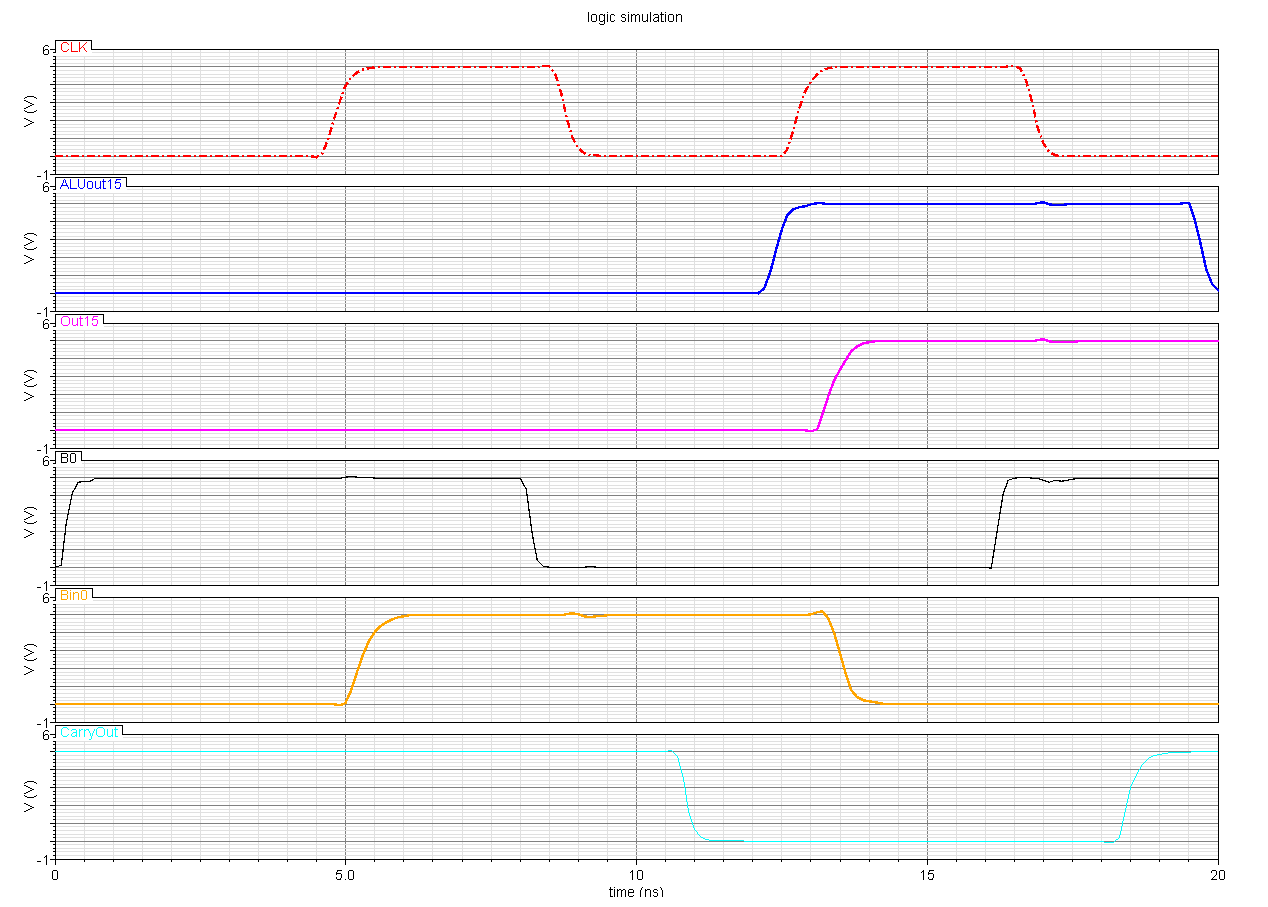
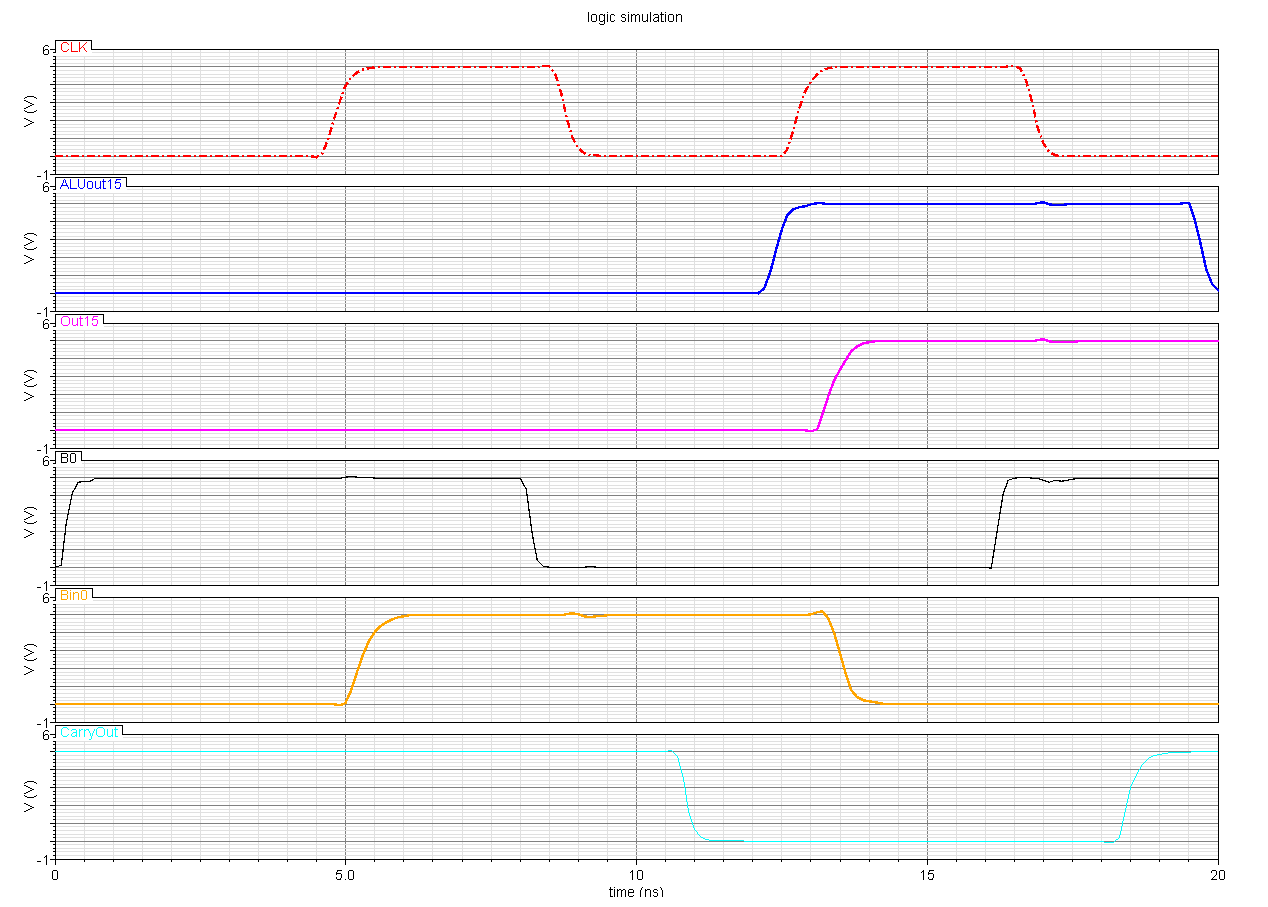
**Supplemental Information**

1.) **Critical Path Simulation**

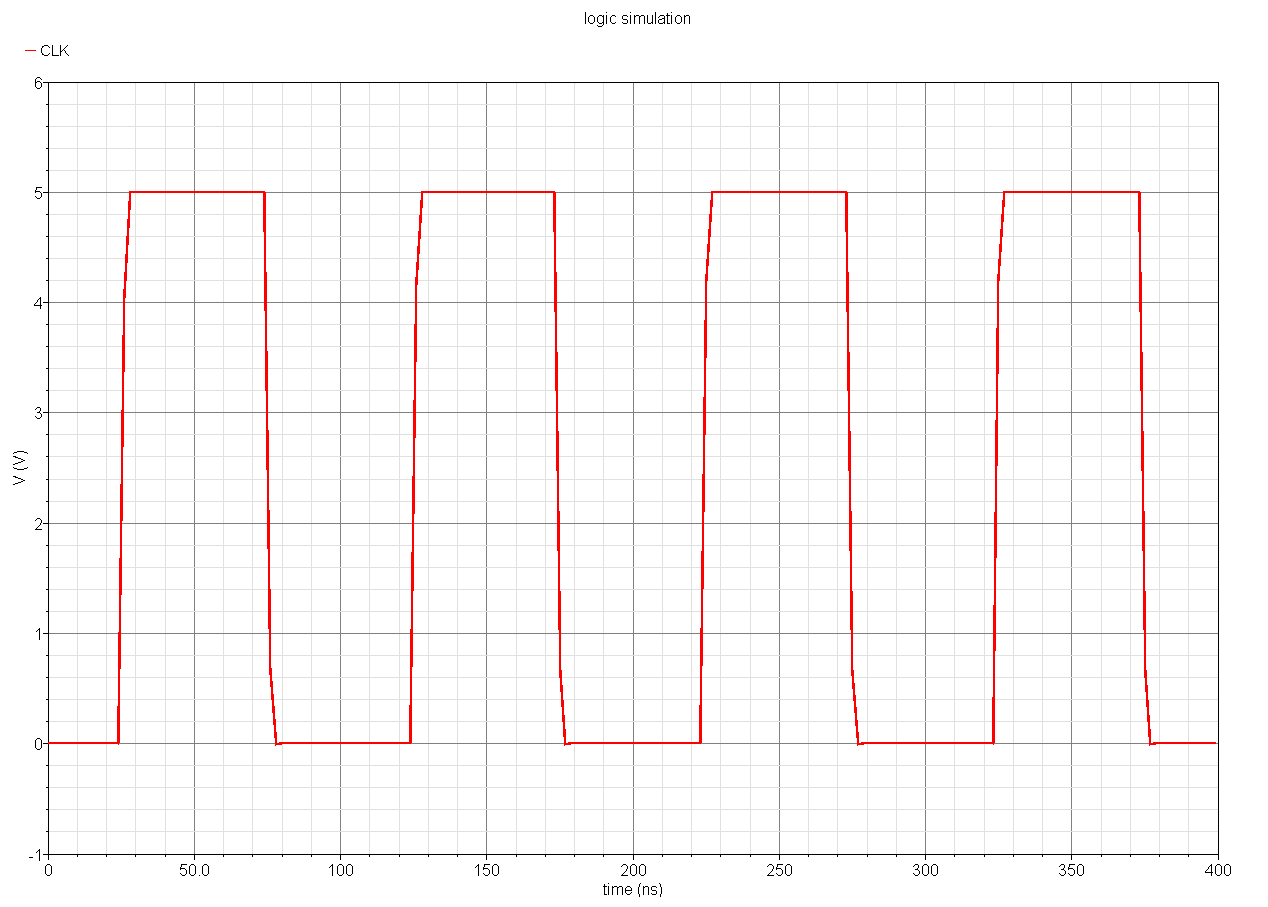


*This plot shows the critical path of the ALU, the shift from A=0x0 , B=0x0 to A=0x0 , B=0x1. When the Clock (red) changes, it latches the B input (black) and passes through Bin0 (orange). The new value of Bin0 passes through the subtractor along the critical path until ALUout15 (blue) changes before the next rising clock edge and is latched to out15 (magenta). The carry out is asynchronous because it is not connected to a register.*

2.) **Arbitrary Function Critical Path Simulations**

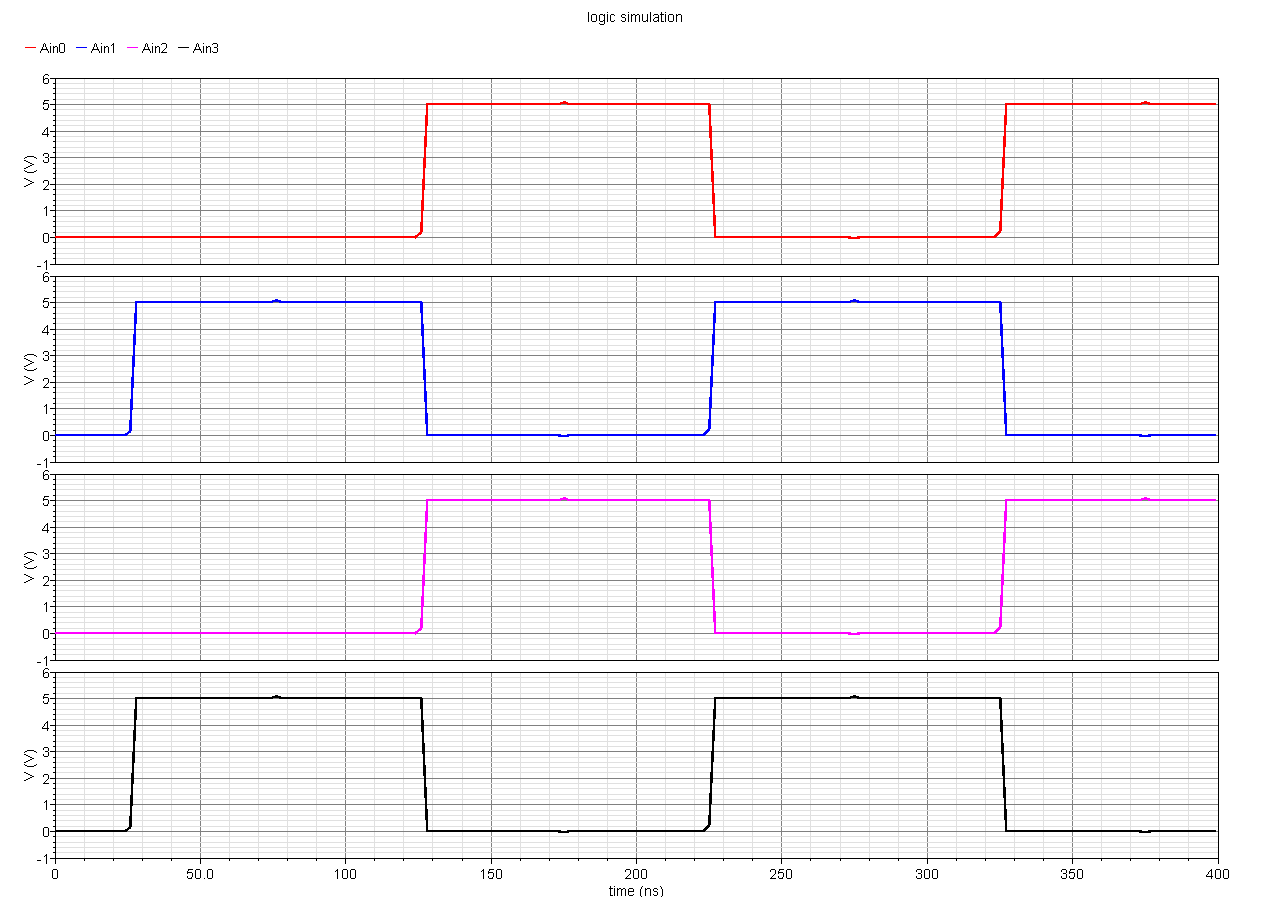
The following plots illustrate the operation of our multiplier. The A input flips between 0xAAAA and 0x5555. B is set to be 0xAA55. The output is expected to flip between 0x8E72 and 0xC739.

CLK



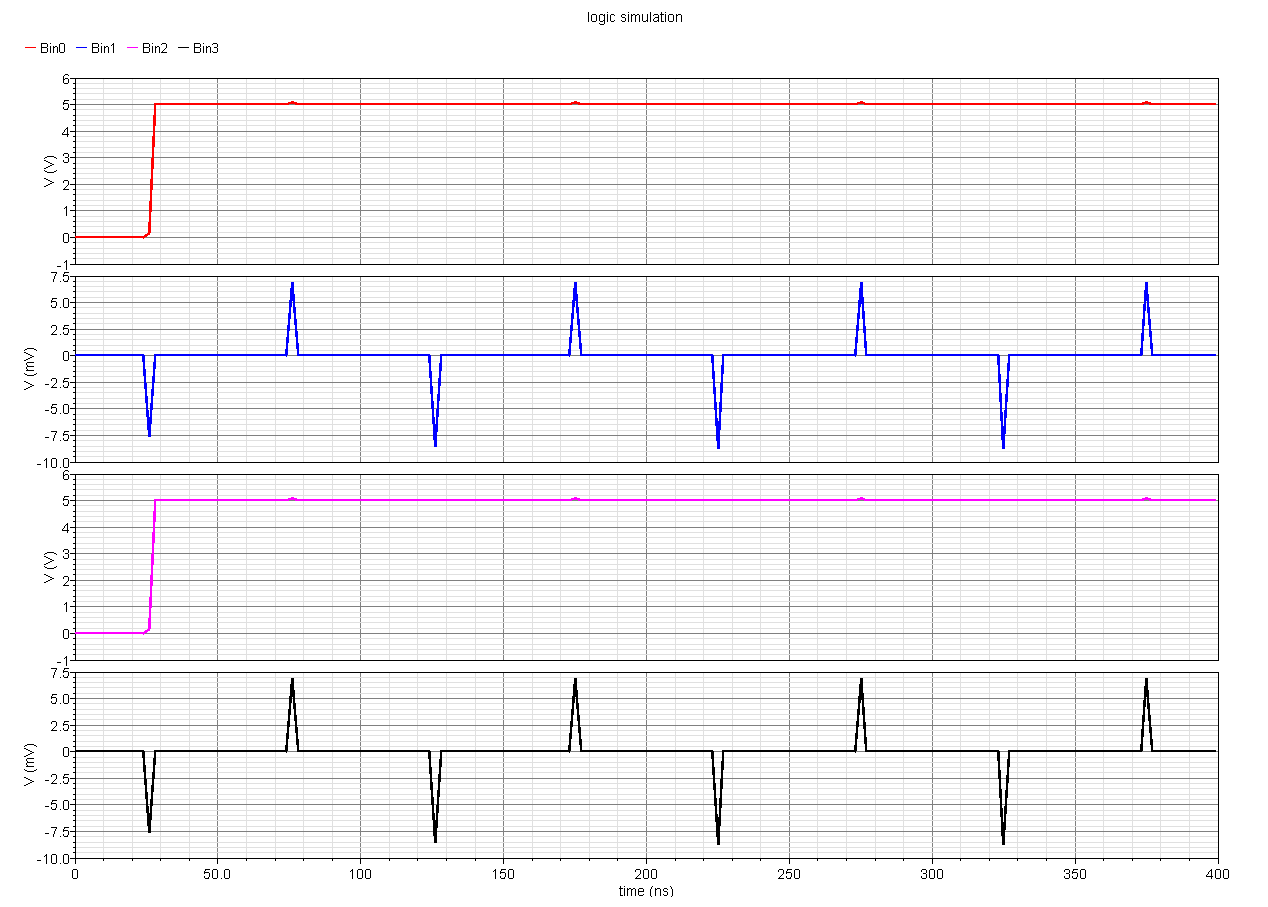
*This plot shows the CLK input to the entire ALU*

AIn<0:3>



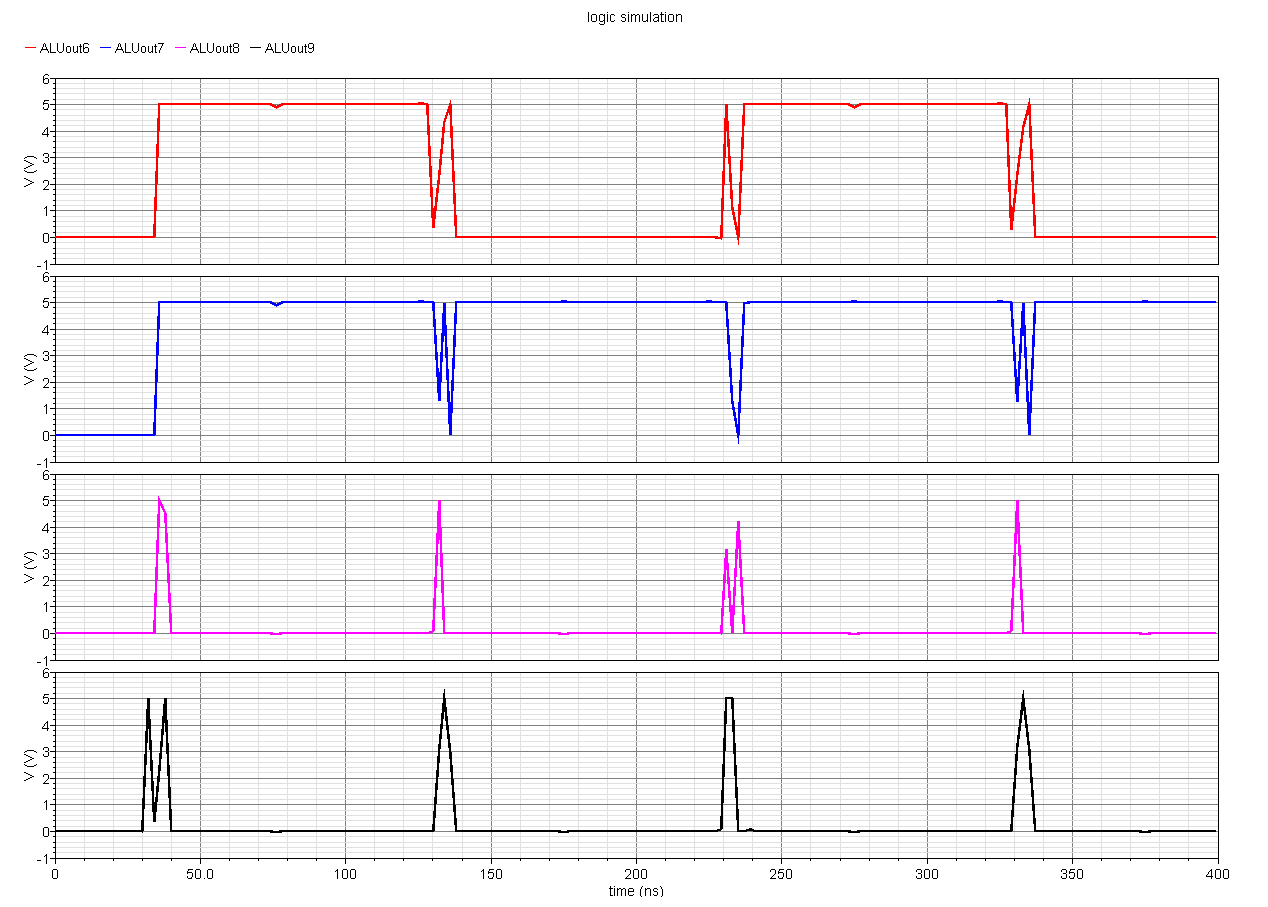
*This plot shows the first 4 input signals on the A input of the ALU. The inputs alternate between high and low.*

Bin<0:3>



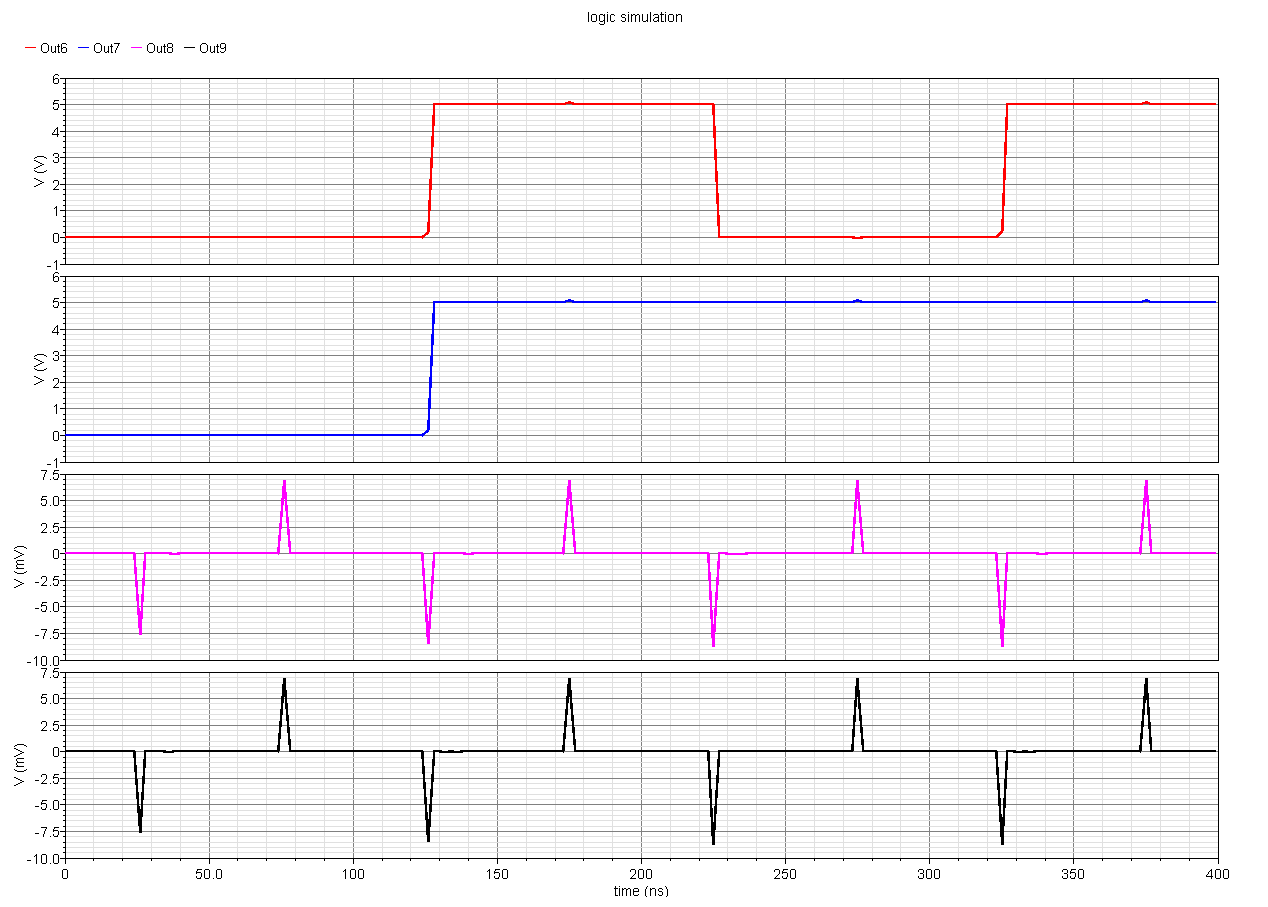
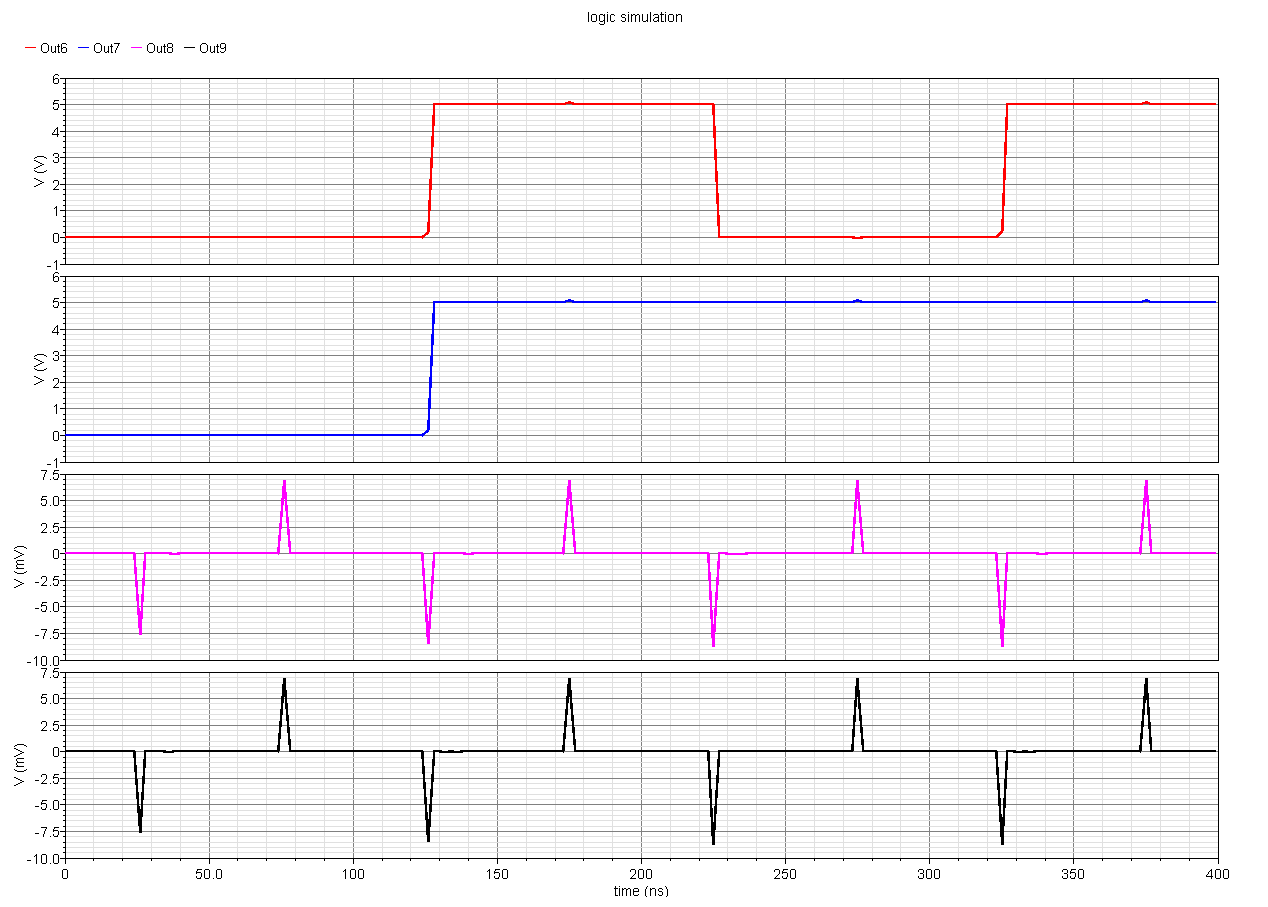
*This plot shows the first 4 input signals on the B input to the ALU. B0 goes high and B2 goes high. The others stay near zero (with minor glitching).*

ALUOut<6:9>



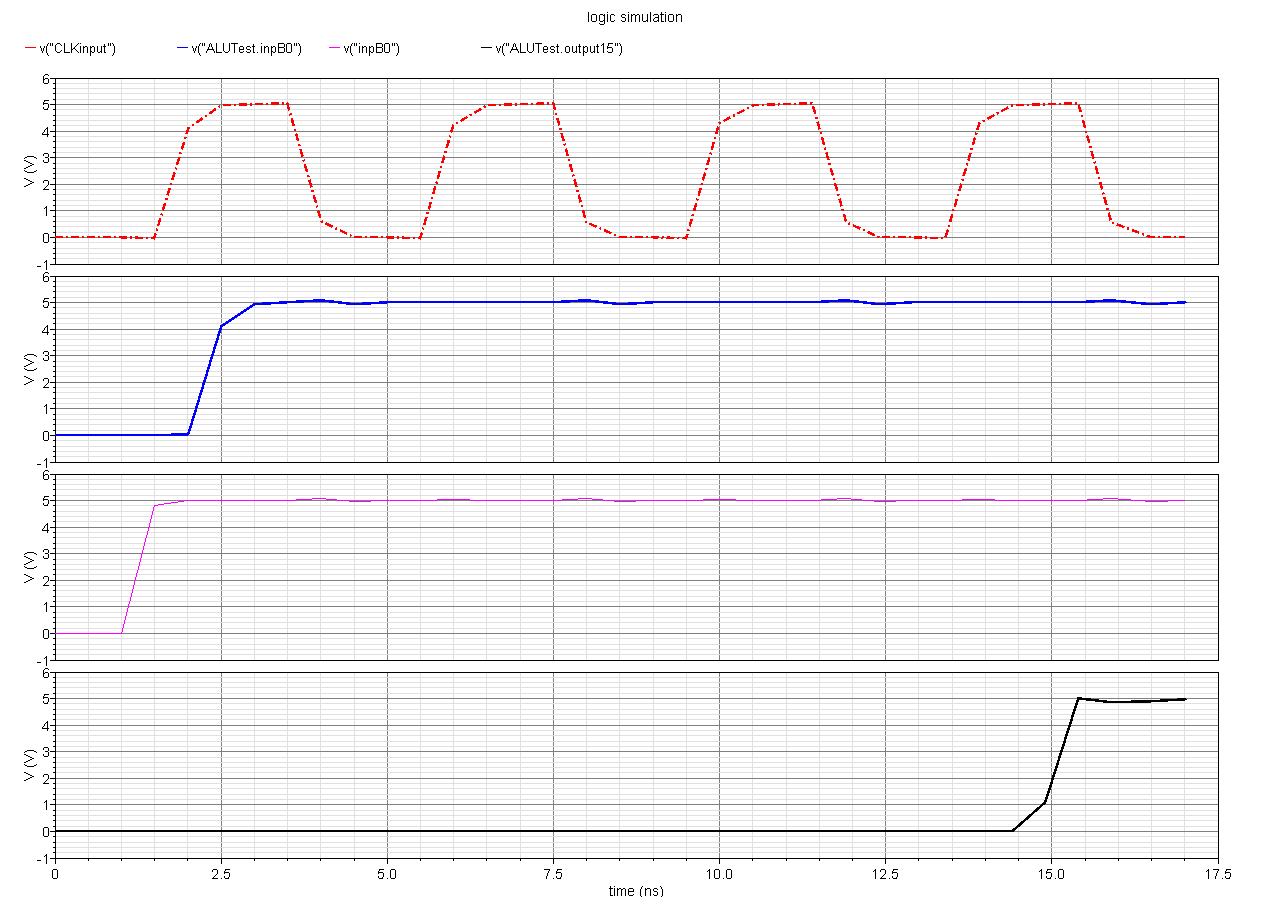
*This plot shows the ALUout of the circuit in response to the changes in inputs.*

Out<6:9>



*This plot shows the final output of our design in response to our changes in input.*

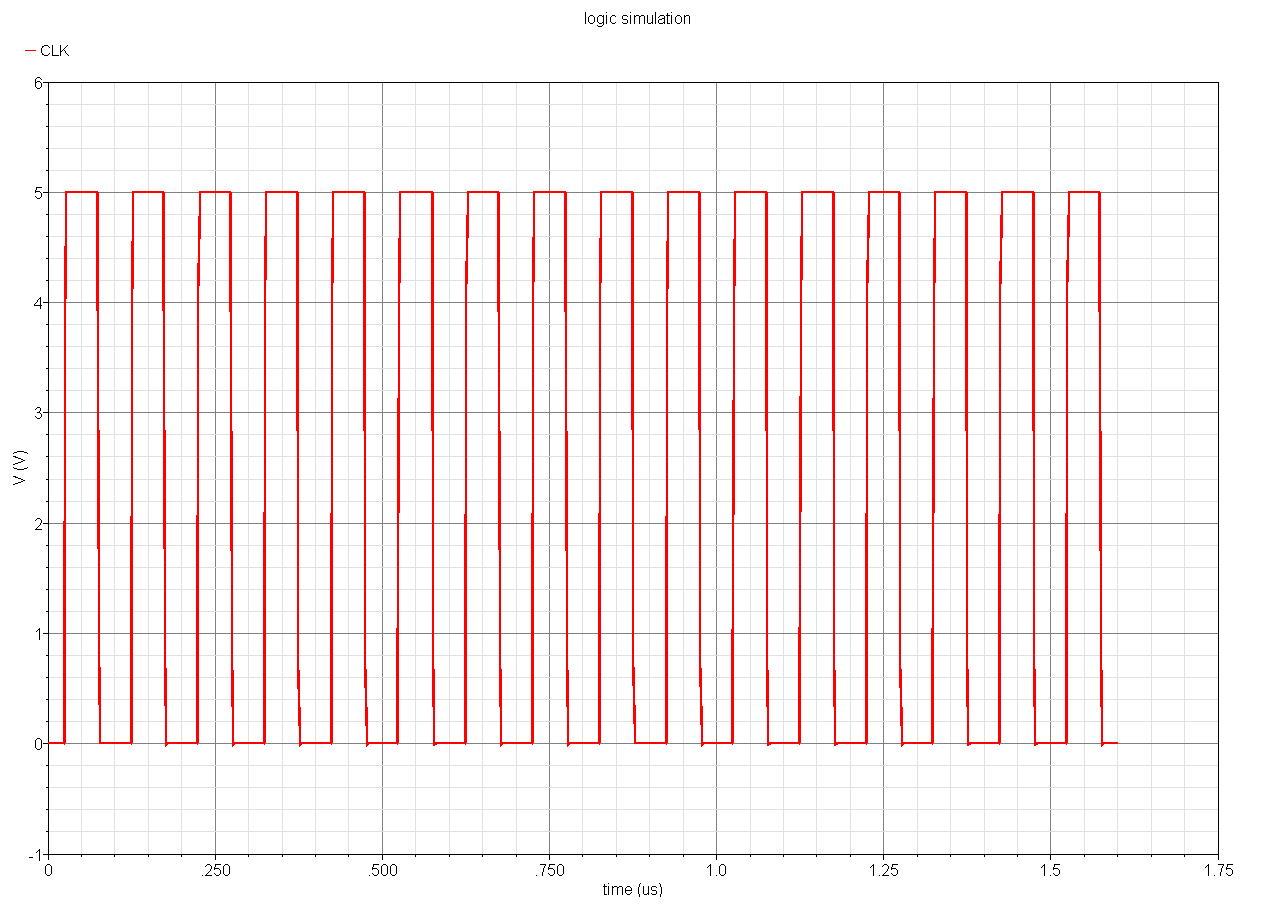
Multiplier Delay Plot



*This plot illustrates how we got our delay. The delay was measured by finding the time it takes the output (black) to go high after the input (magenta) changes.*

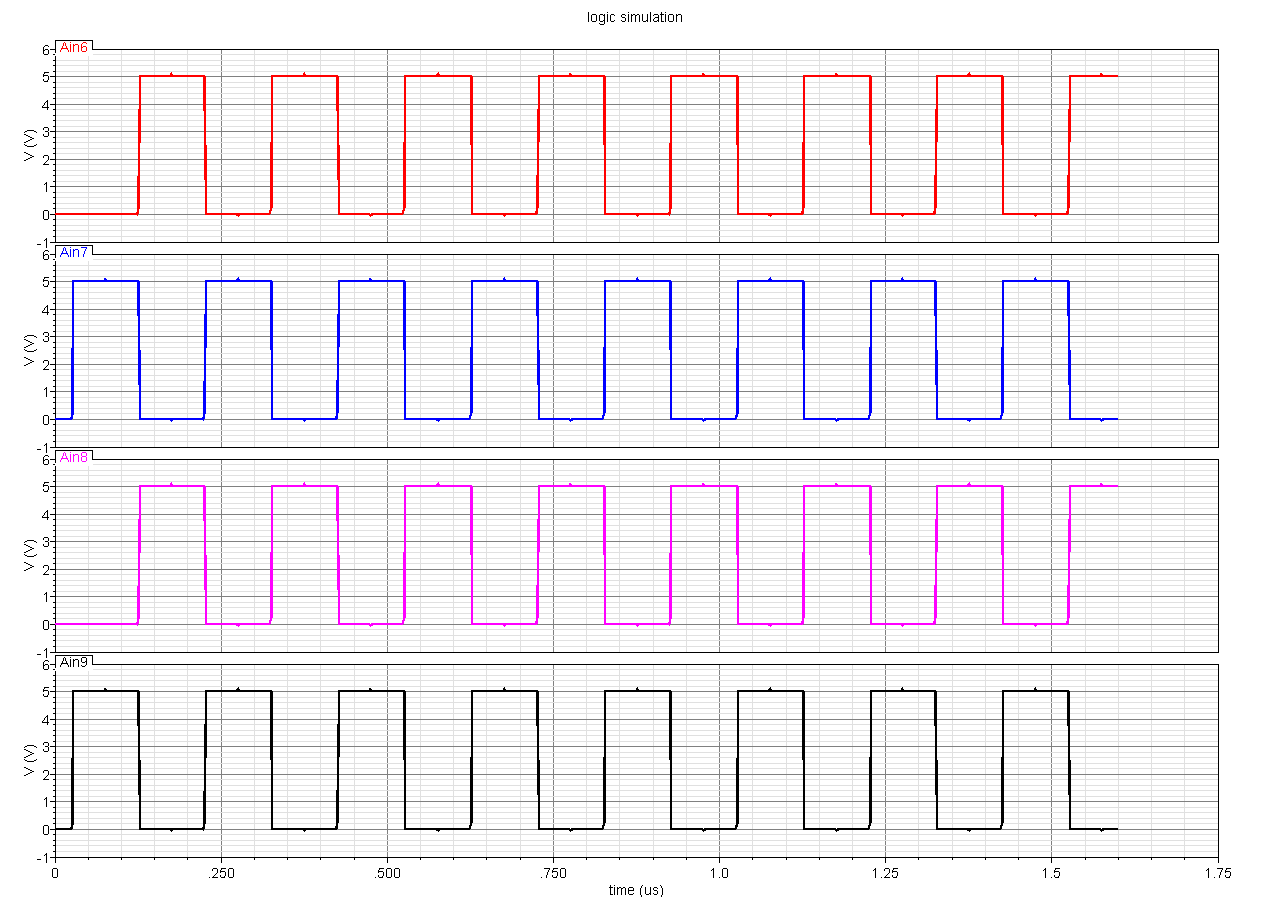
3.) **Energy Simulations**

CLK



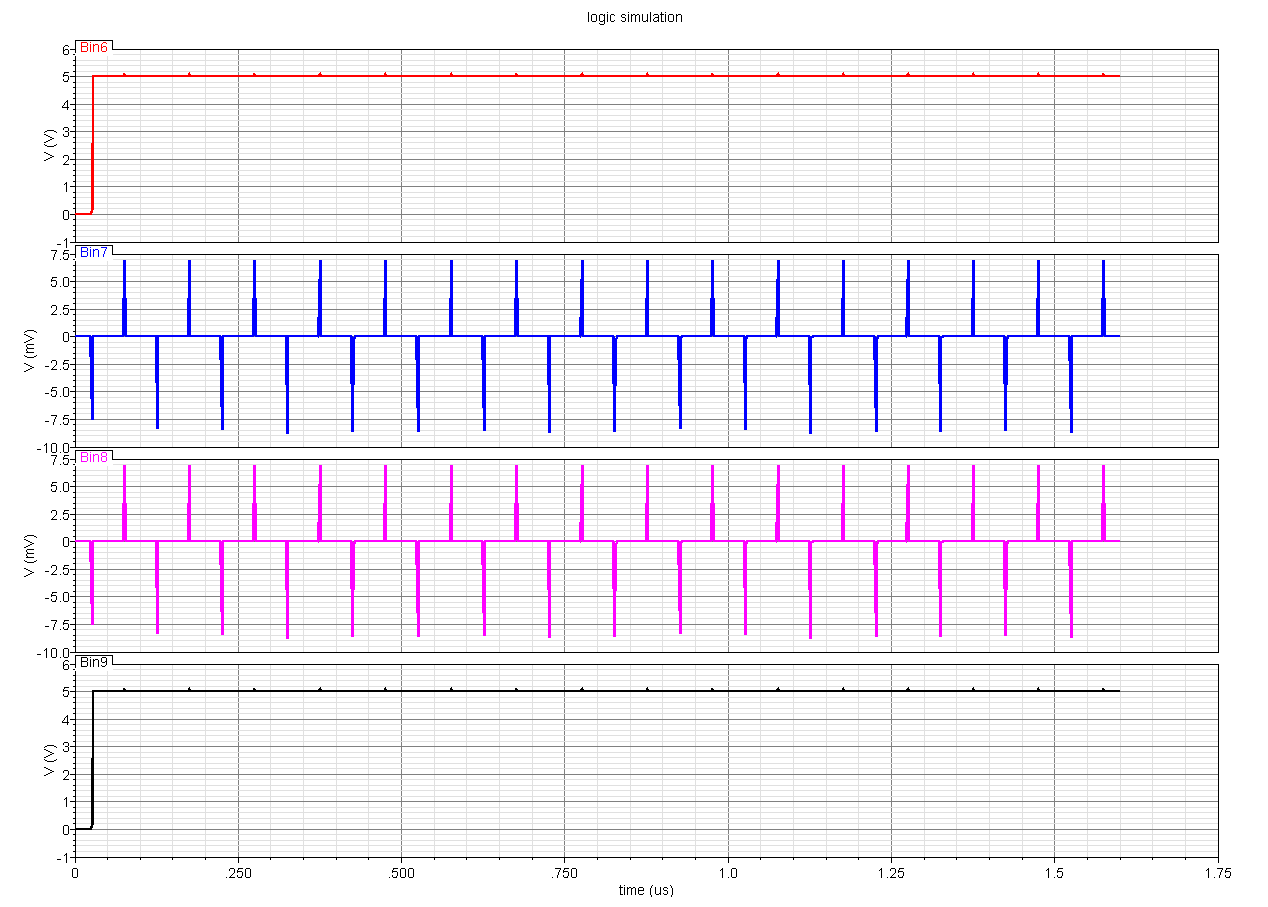
*This plot shows the clock voltage over time.*

Ain<6:9>



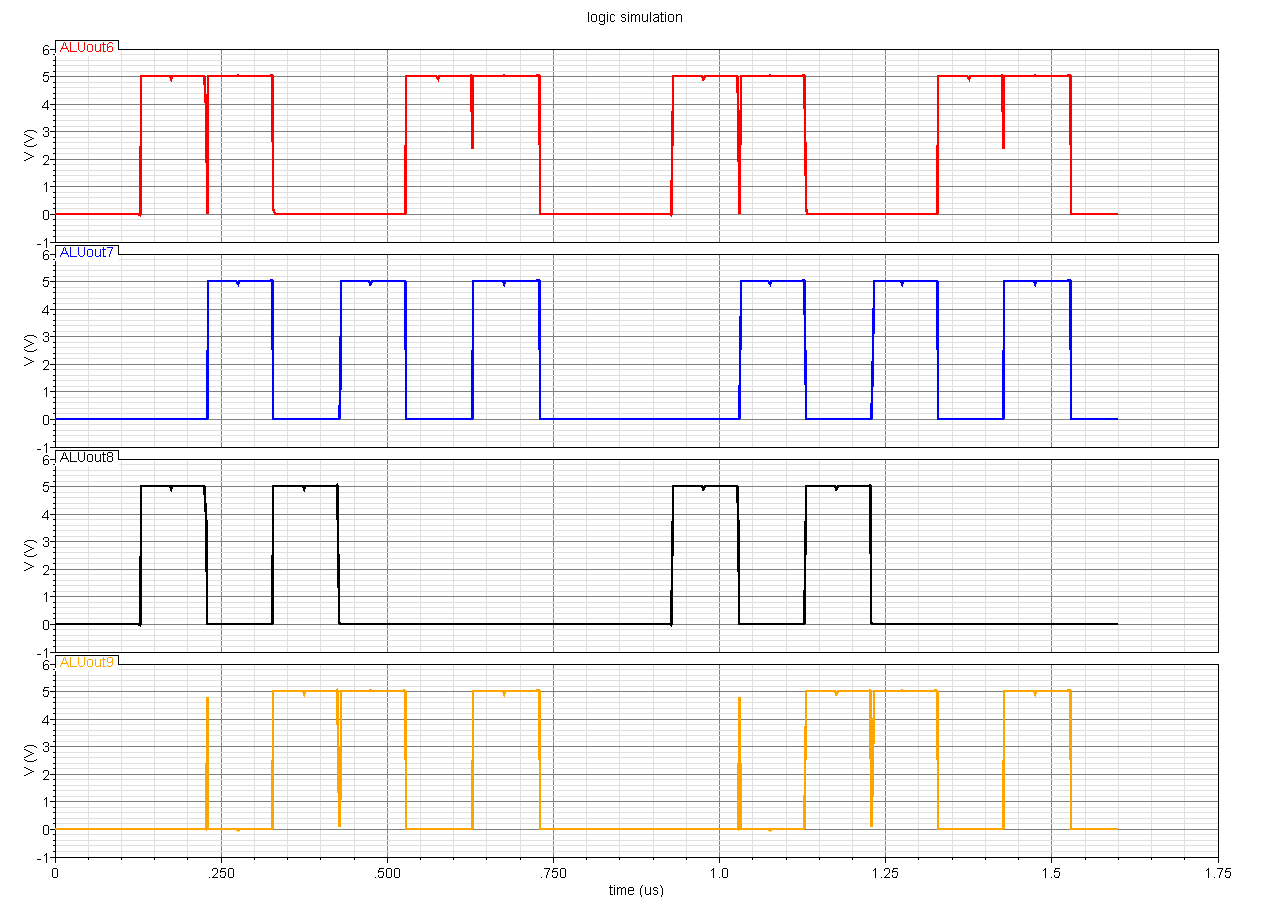
*This plot shows bits 6-9 of Ain, respectively, top to bottom.*

Bin<6:9>



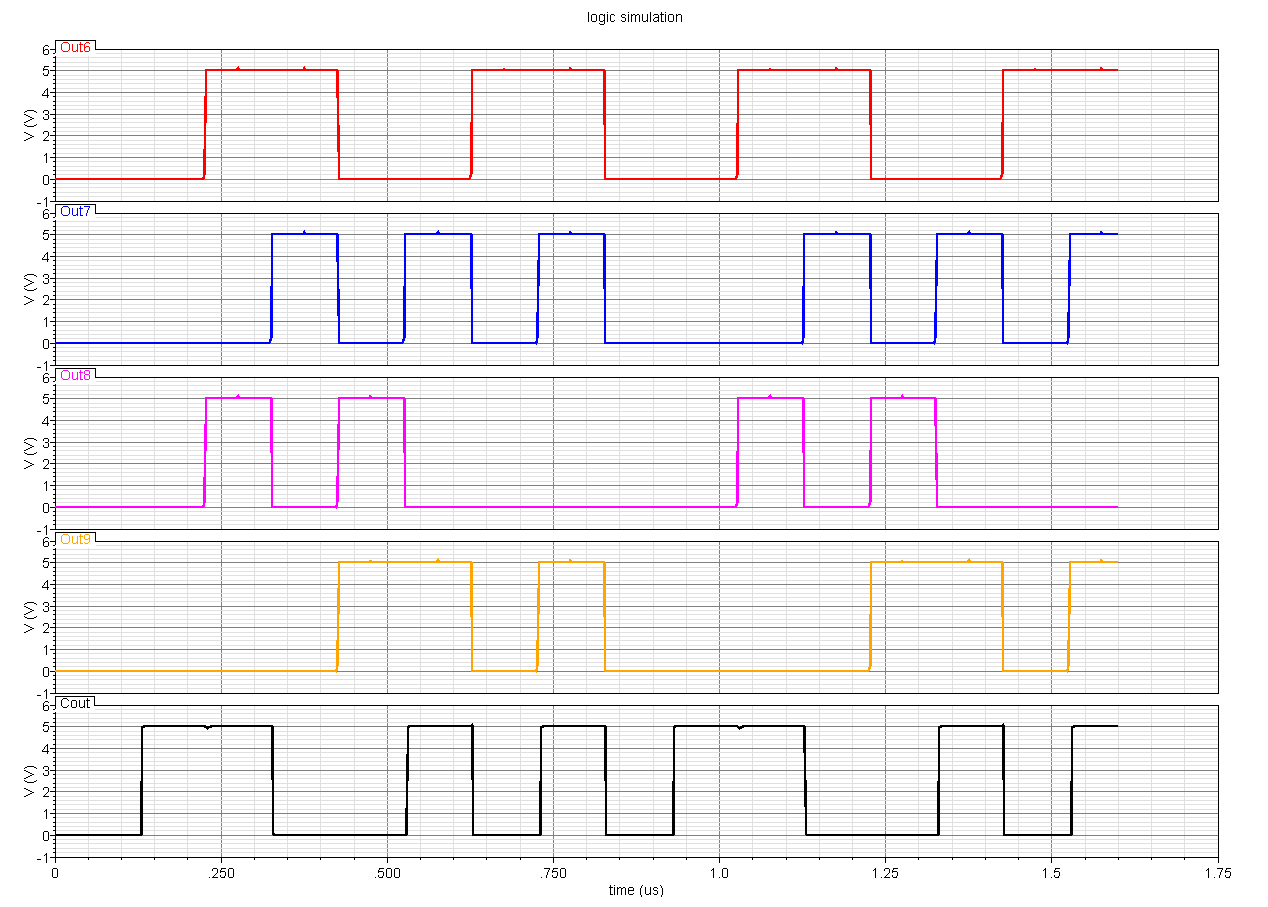
*This plot shows bits 6-9 of Bin, respectively, top to bottom.*

ALUout<6:9>



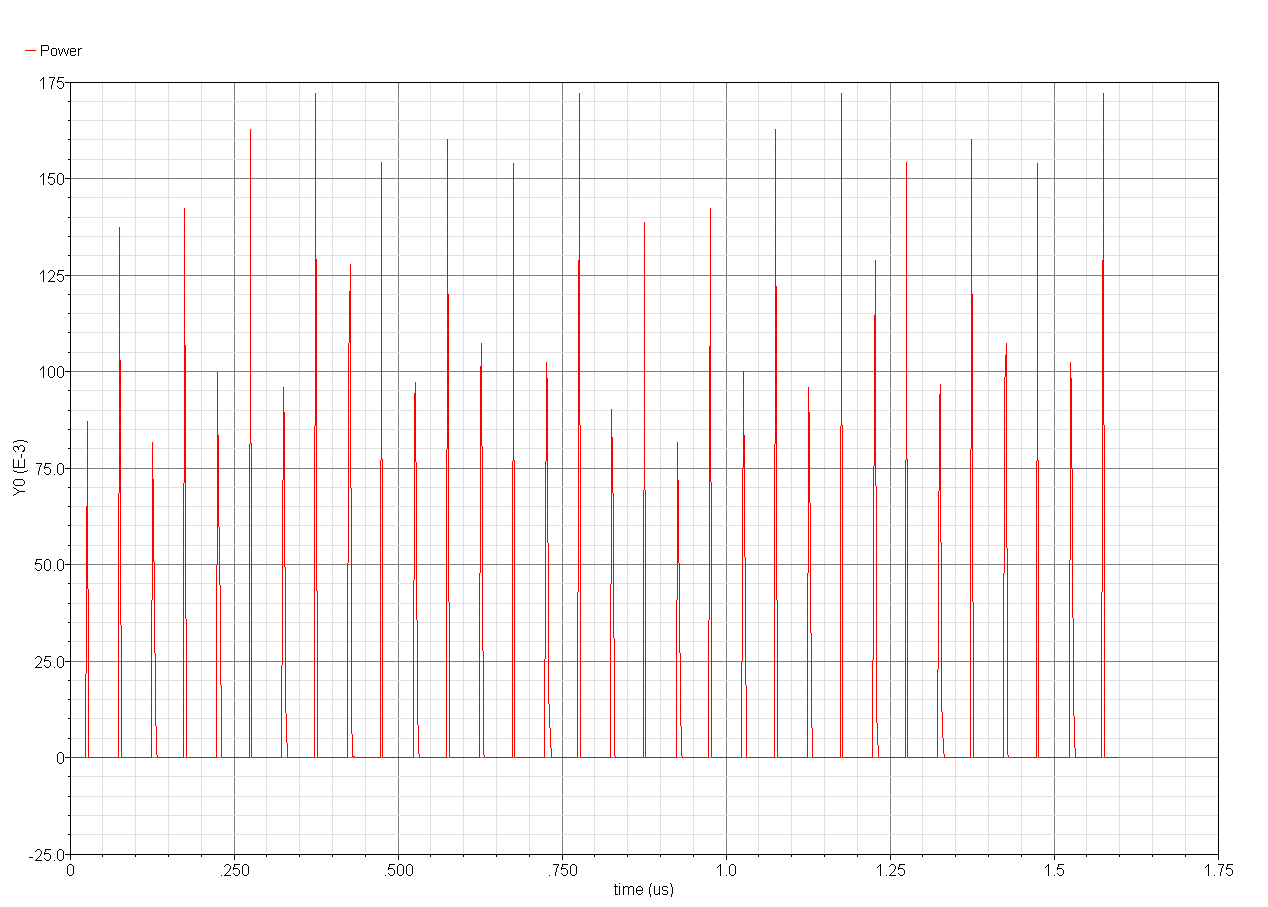
*This graph shows bits 6-9 of ALUout, respectively, top to bottom.*

Out<6:9>/CarryOut



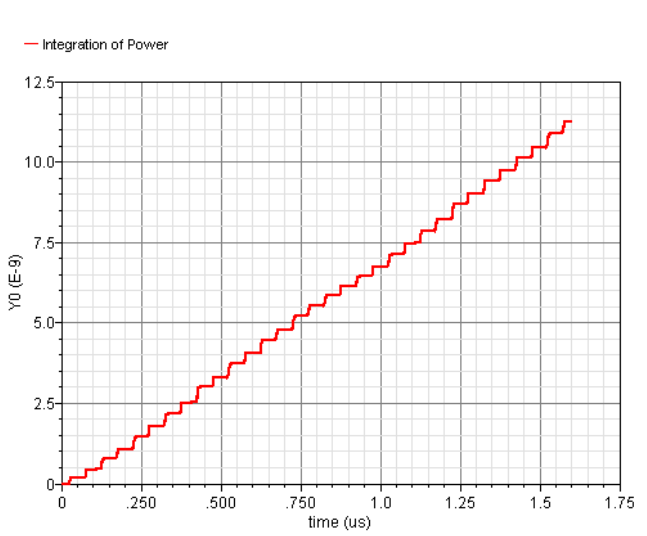
*This graph shows bits 6-9 of the output, as well as CarryOut, respectively, top to bottom*

Power



*This graph shows the power consumption. As you can see, power is consumed only during transitions.*

Energy



*This graph shows the total energy dissipated over time. It looks stepped because power is only consumed during transitions.*